

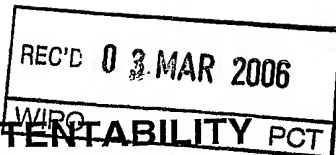
PATENT COOPERATION TREATY


PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY PCT

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference P210318PCT		FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/NL2005/000083		International filing date (day/month/year) 04.02.2005	Priority date (day/month/year) 06.02.2004	
International Patent Classification (IPC) or national classification and IPC A23L1/217, A23L1/216, A23L1/015, A23B7/06				
Applicant KONINKLIJKE COÖPERATIE COSUN U.A. et al				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input checked="" type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 05.12.2005		Date of completion of this report 06.03.2006		
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Vuillamy, V Telephone No. +31 70 340-3504		



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/NL2005/000083

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-19 as originally filed

Claims, Numbers

1-21 received on 05.12.2005 with letter of 05.12.2005

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/NL2005/000083

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-16
	No: Claims	17-21
Inventive step (IS)	Yes: Claims	1-16
	No: Claims	17-21
Industrial applicability (IA)	Yes: Claims	1-21
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/NL2005/000083

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The following documents are referred to:

D1: US-A-3 109 739	D2: WO-A-2004/004484
D3: GB 978 818 A	D4: WO-A-02/39828
D5: US-A-5 965 189	D6: US-A-3 835 222
D7: WO-A-01/78524	D8: JOURNAL OF FOOD ENGINEERING, (52)2002

V.1/ The present application does not meet the requirements of Article 33 PCT because the subject-matter of claims 17-21 is not new in the sense of Article 33(2) PCT.

Remark - The features of claims 17-21 reflect a low reducing sugar and/or asparagine content (claims 17 and 20), a high retention of valuable water-soluble components (claim 18, 19), and the use of acid pyrophosphate (claim 21). These features are considered as implicitly present (when not explicitly disclosed) in the prior art products when their process of obtention obviously leads to a similar result.

- The feature 'blanched' of claims 19 and 20 does not appear to allow differentiating the products of these claims from prior art heat-treated potato products, because this term encompasses an undefined range of heat treatments (various durations and temperatures).

V.1.1/ The subject-matter of claim 17, 19 and 20 is not new over D2 (cf. p.1, l.65-68), disclosing potato products made from potatoes of less than 0.2% reducing sugars. The loss of soluble components is regarded as minimized (no blanching step mentioned).

V.1.2/ The subject-matter of claims 17-19 is not new over D3, disclosing (cf. p.7, par.3-4; ex.11) potato products treated with an hexose oxidase. This process obviously leads to fried potato pieces with low acrylamide level and preserved levels of potassium and citric acid (no blanching step).

V.1.3/ The subject-matter of claims 17-19 is not new over D4, disclosing (cf. p.4, par.5 to p.10, par. 3; ex. 1; claims) food products like potato products baked under conditions avoiding acrylamide formation and loss of soluble components (no blanching step).

V.1.4/ The subject-matter of claims 19 and 21 is not new over D5, disclosing (cf. fig.1; col.2,

l.12-24) potatoes blanched with steam, and therefore having a high retention of water-soluble components. The potato pieces are further treated with sodium acid pyrophosphate (SAPP). This customary treatment normally provides at least 100mg SAPP /kg product.

V.2/ The subject matter of claims 1-16 is not disclosed nor suggested in the available prior art, and meets the requirements of Article 33(3) PCT.

The closest prior D4 mentions the problem of acrylamide formation in baked or fried products like potatoes, and suggests various solutions, including removing reducing sugars or asparagine, eg with enzymes.

The subject-matter of claims 1 and 13 differs in that the process involves a blanching step, and in that the reducing sugars and/or asparagine are removed from the spent blanching medium, which is then reused. This recirculation of the spent blanching medium (which comprises soluble compounds leached out in the previous stage) results in a better retention of valuable water-soluble components (partly because the extracted components are recycled, but also because diffusion of these components is minimized).

The problem to be solved by the present invention can therefore be seen as the provision of a method for making fried or baked products with low acrylamide levels, the native enzymes being inactivated (blanching), said method minimizing the loss of valuable soluble components.

Blanching is a common step when making eg potato products. Document D8 even teaches that recycling the blanching medium results in a better retention of soluble components. The skilled person would however find no indication to remove the unwanted sugars/asparagine from the spent blanching medium.

D7 suggests the use of various enzymes for improving various properties of potato products, but merely suggests concurrently performing the enzymatic and blanching treatments without further details, and does not suggest recycling the spent water. D7 does not address the present problem of acrylamide reduction, nor does it suggest treating the spent blanching medium (as opposed to the potato product).

Documents D1/D2 teach separating a liquid portion from a pureed potato product, removing reducing sugars/asparagine with enzymes from said liquid portion, and returning a sufficient amount of said liquid so that the initial solids content is achieved (in the examples, only a portion is recycled, and will therefore still result in soluble components being lost). D1/D2 is however not directed to a blanching treatment with recycled spent medium, nor does it address the problem of acrylamide reduction.

The skilled person would therefore not find in these documents any incentive to solve the problem posed by modifying the method of D4 and arrive to the claimed process.

Re Item VI

Certain documents cited

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/NL2005/000083

Late published documents:

EP-A-1419702, published 19.05.2004, filed 15.11.2002

WO-A-2004026073, published 01.01.2004, filed 20.09.2003

WO-A-2005004629, published 20.01.2005, filed 14.06.2004, priority of 25.06.2003

The validity of the priority of the present application has not been examined, but the report is based on the assumption that the valid date is the claimed priority date.

P210318PCT

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5-12-2005

1

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Amended claims:

1. A process of producing a food product by heat-treating a food material containing reducing sugars, comprising the step of blanching the food material, wherein the blanching step comprises subjecting the food material to an active blanching medium under blanching conditions in a blanching section to produce spent blanching medium, withdrawing reducing sugars from the spent blanching medium to produce active blanching medium using a sugar-withdrawing means, and reusing the active blanching medium.
2. The process according to claim 1, wherein the reducing sugars are withdrawn from the spent blanching medium in a desugaring section which is separated from the blanching section, to which desugaring section a stream of spent blanching medium is conducted, and wherein a stream of active blanching medium is recycled to the blanching section.
3. The process according to claim 1 or 2, wherein the sugar-withdrawing means is one or more conversion agents capable of converting reducing sugars, wherein the conversion agents are selected from the group consisting of bacteria, yeasts, moulds and enzymes.
4. The process according to claim 3, wherein the conversion agent comprises one or more micro-organisms capable of converting glucose and/or fructose.
5. The process according to claim 3 or 4, wherein the micro-organisms are selected from the bacterial genera *Lactobacillus*, *Bacillus*, *Streptococcus*, *Oenococcus*, *Leuconostoc* and *Zymomonas*, yeast genera *Saccharomyces* and *Candida*, and fungal genera *Aspergillus* and *Rhizopus*.
6. The process according to claim 5, wherein the micro-organisms are selected from the species *Bacillus coagulans*, *Lactobacillus gasseri*, *Lactobacillus manihotivorans*, *Lactobacillus plantarum*, *Streptococcus thermophilus* and *Zymomonas mobilis*.

P210318PCT

5-12-2005

2

7. The process according to claim 3, wherein the conversion agent comprises one or more enzymes that are kept separated from the food material.
- 5 8. The process according to claim 7, wherein the enzyme is a glucose oxidase, a mannitol dehydrogenase or a glucose-fructose oxidoreductase, or a combination thereof.
9. The process according to claim 7 or 8, wherein the enzyme is present in the
10 desugaring section in concentrations in the range of 10^2 to 10^5 , preferably of 10^3 to $5 \cdot 10^3$ enzyme units per gram glucose in the spent blanching medium.
10. The process according to claims 1 or 2, wherein the sugar-withdrawing agent is a sorbent capable of selectively adsorbing reducing sugars.
- 15 11. The process according to claim 10, wherein the sorbent is used in a chromatographic separation method such as a Simulated Moving Bed process (SMB) or an Improved Simulated Moving Bed process (ISMB).
- 20 12. The process according to any one of the preceding claims, wherein the reducing sugar content of the food material after blanching is less than 0.25 wt.%, preferably less than 0.1 wt.%, more preferably less than 0.05 wt.% of the blanched food material.
- 25 13. A process of producing a food product by heat-treating a food material containing reducing sugars, comprising the step of blanching the food material, wherein the blanching step comprises subjecting the food product to an active blanching medium under blanching conditions in a blanching section to produce spent
30 blanching medium, withdrawing reducing sugars and/or asparagine from the spent blanching medium to produce active blanching medium using a desugaring and/or asparagine-withdrawing means, and reusing the active blanching medium.

P210318PCT

5-12-2005

3

14. The process according to claim 13, wherein the desugaring and/or asparagine-withdrawing means is an enzyme or a sorbent capable of selectively converting or adsorbing asparagine and/or reducing sugars.
- 5 15. The process according to any one of the preceding claims, wherein the reducing sugars are fructose and/or glucose.
16. The process according to any one of the preceding claims, wherein the food product is a potato product.
- 10 17. A fried, baked, roasted or grilled potato product prepared from whole potatoes, having an acrylamide content lower than 150 μg per kg potato product.
18. The potato product according to claim 17, further comprising at least 3 g potassium and at least 3.5 g citric acid per kg product.
- 15 19. A blanched potato product prepared from whole potatoes, comprising at least 3 g potassium and at least 3.5 g citric acid per kg product.
- 20 20. The blanched potato product according to claim 19, further comprising a reducing sugar content less than 0.25 wt.%, preferably less than 0.1 wt.%, more preferably less than 0.05 wt.% of the product.
21. The blanched potato product according to claim 19 or 20, further comprising at least 100 mg of an acid pyrophosphate per kg product.
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